SOIL conservation

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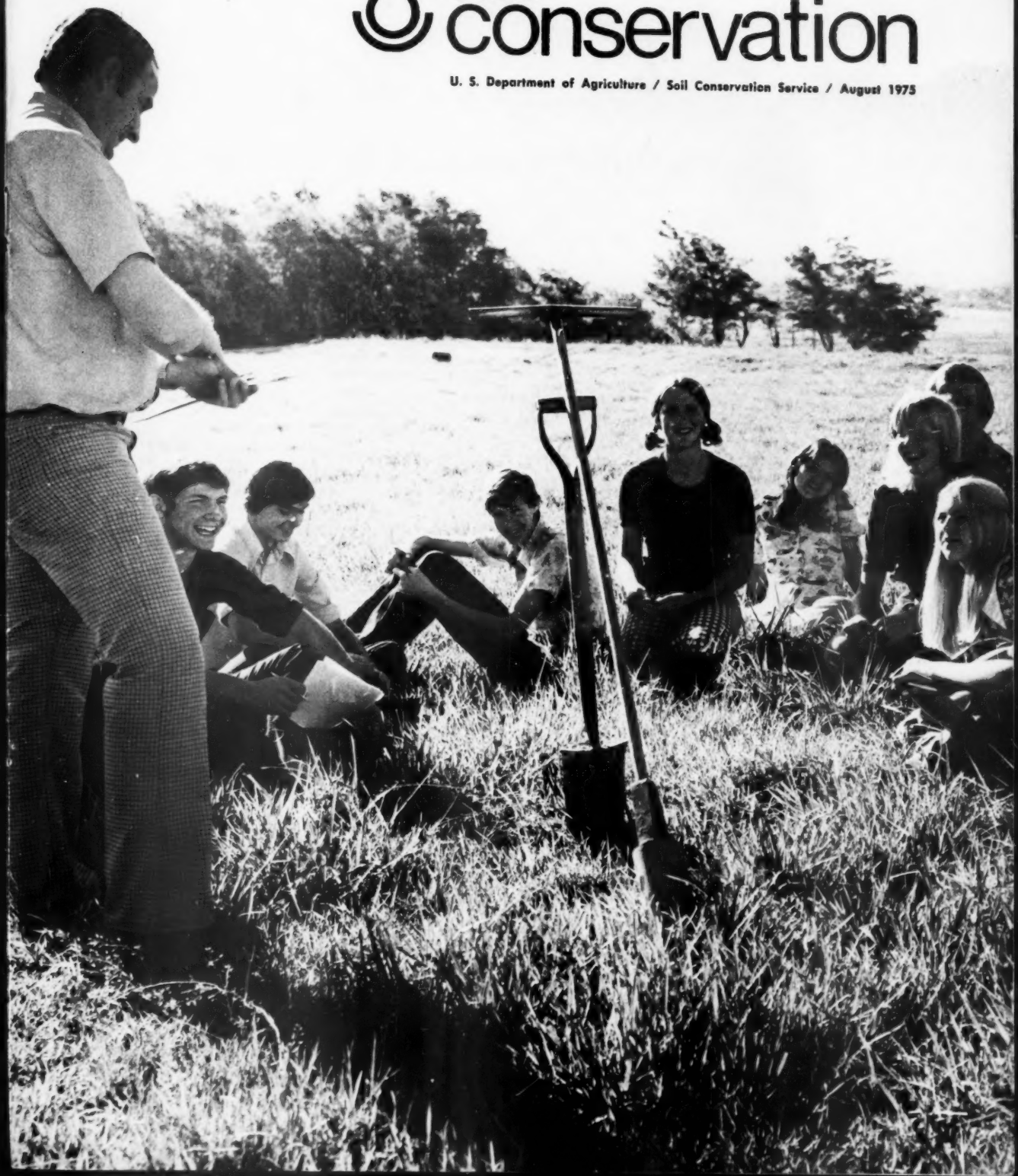

From the Administrator

Broadening Role In Conservation Education

Some 8 years ago, after experiments on school sites in New Jersey, the District of Columbia, and Michigan, the Soil Conservation Service initiated a nationwide effort to help schools plan and use outdoor classrooms.

Today there are outdoor learning areas in just about every conservation district in the United States, a large proportion of them designed with SCS and district help.

Outdoor classrooms today, however, are but a part of the broad field of environmental education. And SCS employees are being called upon to serve environmental education, not only as school site planners and conservationists, but also as resource people—as sources of information about use and care of soil and water resources.

It isn't unusual any more for a district conservationist in a single week to speak to a women's club, a service club, a Scout troop, and confer with several school officials. Further, most of our people manage to handle these assignments in a way that wins the Service many new friends among teachers and students, young people and adults.

SCS people are learning that helping teachers gain an understanding of conservation is an efficient way of reaching a large audience of future leaders and decisionmakers. This way of multiplying our efforts deserves the attention of every one of us.

The typical citizen today is confronted with a bewildering lineup of controversies over the environment. He receives conflicting information on practically every resource issue, being assured one minute that all is well and the next told that doom is imminent. And on the basis of all these divergent reports the citizen must make informed decisions about the future of our resources.

Obviously, it is impossible to be able to make such decisions without facts. That is where districts and SCS can be of increasing service to all Americans. We cannot afford to shrink from our responsibilities in environmental education. There's too much at stake.

SOIL conservation

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Earl L. Butz
Secretary of Agriculture

R. M. Davis, Administrator
Soil Conservation Service

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Diana Morse
Editor

Maryellen Bertram
Editorial Assistant

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COVER: In Utah, J. Kent Hortin, SCS district conservationist, meets with students taking a summer credit course on the Jordan River (see story on p. 4).

Canoe trips to observe and study plant and animal life were a part of the Jordan River environmental study project.

Jordan River— Utah's Newest Environmental Study Area

by J. Kent Hortin
District conservationist, SCS, Salt Lake City, Utah

Two years ago students from the four high schools of Jordan School District near Salt Lake City, Utah, pioneered a summer credit course officially titled "Environmental Education: Jordan River Project."

One hundred and thirty students spent 3 weeks studying the river and its environment for 30 miles, from its freshwater source in Utah Lake near the city of Provo to the end of its journey as it disappears into the salt waters of Great Salt Lake.

That pioneer study proved so successful that the Jordan River project not only continued the following year, but has been funded for both 1975 and 1976.

For more than 128 years the Jordan River has been a source of water for people, a drainage outlet, a dumping ground for sewage, a fishing stream, and a source of irrigation water that spreads green fields across Salt Lake Valley.

The river was named by the first settlers during the 1847 annual conference of the LDS (Mormon) Church. They had noted the similarity to the Biblical Jordan River that runs from the freshwater Sea of Galilee to the salt-laden Dead Sea.

The idea for the environmental study originated with four high school coordinators: Glen Soulier, science; Boone Colegrove, social studies; George Shell, mathematics; and Lowell Boberg, English. They assembled a team of eight high school teachers, two from each discipline, and met with resource managers from Soil Conservation Service, Forest Service, Bureau of Land Management, Bureau of Reclamation, with representatives of the Salt Lake County Health Department and the Jordan River Parkway, and with officials of an irrigation company.

Through the help of students from the four high schools, a series of 24 varied but river-related projects was developed and student-tested.

For 3 weeks that summer, the 130 students who enrolled in the Jordan River project spent 4 hours each day on some phase of the project. Because their experiences were multidisciplinary, the students could earn one-half unit credit in any one of the four disciplines: English, social studies, science, or mathematics.

The format for the study has remained much the same each year. Some students elect to concentrate on water testing at various points along the Jordan while others study land-use planning in the same area, using soils as a basis.

Students spend one morning on the geologic history of the river revealed on the rocks at Jordan Narrows, a point where the river cuts through mountains on its way to Salt Lake Valley.

Some of the students make studies of the river plants and animal species, including fish habitat. The mathematically inclined often choose surveying and mapping of the river basin.

History buffs learn about the people who settled the valley and the changes that have occurred there over the years by visiting the State Historical Society. Others collect Indian lore about the river at the Hutchins Museum in the nearby community of Lehi.

Besides the natural resource and historical studies, visits are made to the state prison and to a sewage treatment plant. One project involves locating and measuring the capacity of storm sewers.

Use of water is of particular significance in arid states such as Utah, so part of the project is devoted to understanding how the river water is allocated and used in both agricultural and municipal areas of the valley.

Special attractions during the 3-week course are a 6-mile canoe trip on the river and an overnight campout.

On bird-watch day the students are out early and arrive by daybreak at Utah Lake to observe larks, bluebirds, bluejays, and the many other birds along the way.

Putting it all together means discussions before and after the project, filming a documentary on the studies, and preparing slide-tape programs. Many students do watercolors of river scenes; others read river poetry and put their feelings and thoughts into poems of their own.

Nor does it stop here. Many of these experiences are relived and taught to new students the succeeding year by teachers who become thoroughly involved in this type of teaching.

Students who enroll for the summer are of two distinct groups—those who love to learn and are eager for new experiences and those who need a chance to make up a half credit, preferably without the drudgery of the traditional classroom. Within a few days the differences disappear. In-

Students gained a broad understanding of the importance of water quality to the people of the river valley areas. Among the continuing activities during the summer were water testing techniques and data recording.

Through group discussion of literature on famous rivers and creative efforts by students writing poems, stories, and songs, appreciation of the esthetic value of the river environment is encouraged.

RIVER

The river sloshes at its banks
And runs or wanders through
the ranks
Of oak and sagebrush never
ending,
A world of time it's spending . . .
Peaceful, quiet, or full of strife . . .
Much like the human way of life.

—John Johanson
Brighton High School
Jordan School District

terest in activities and the freedom of outdoor investigations soon erase all contrasts among the students.

Teachers can cite many evidences that the overall objectives of the project—to help students gain a sense of the importance of the Jordan River as a natural resource in their environment and their lives—have been achieved.

Positive changes in student attitudes toward the environment develop during the project. These changes are reflected in post-project questionnaires. Most significant, students are working with real-life environmental concerns, the close-to-home problems that can soon be tackled by the young people themselves, rather than a textbook study of remote and complex global issues far removed from their experiences.

Teacher enthusiasm has matched that of the students. Many of the teachers have commented that the project was both a teaching and learning experience for them.

This year, the Jordan River School District decided to expand the program. The original Jordan River project will be offered in alternate years. Beginning this summer, a companion study course focusing on the three distinct areas of desert, valley, and mountain, all within or adjacent to the Jordan School District boundary, had its first run.

Following the pattern set by the Jordan River project, students worked with the teachers in planning and testing the new multidisciplinary program.

Desert studies will emphasize plant and animal relationships in the arid environment. Native plants such as shadscale, grease wood, and alkali sacaton will be studied in contrast to less desirable invader plants that often follow overgrazing of range lands—such plants as halogeton and woollyloco weed that are poisonous to livestock. The desert as a fragile ecosystem, where any disturbance of vegetation requires many years to repair, will also be a part of the investigation.

The valley study will be a miniature Jordan River project to show how this environment is dependent on the nearby desert and mountain areas.

Investigations of the mountains will show the relationship of the winter snowpack to the water supply for farms and cities in the valley. Students will learn snow survey techniques used to determine the water content of the snow and to help forecast the amount of water available during the coming year.

Of major concern to the students as they explore the mountain environment is the question, "What is to become of the mountains and canyons? Should they be further dotted with summer homes, condominiums, and resorts, or is the area of more importance as a watershed, the source of the valley water supply—or are the two extremes of use by people compatible?" ♦

Education Majors Tackle Environmental Studies At Grambling University

by Gene Warren
Information officer, SCS, Alexandria, Louisiana

One of a growing number of colleges and universities offering future teachers training in environmental studies as part of the Division of Education program is Grambling University in Louisiana.

This university has developed an outdoor learning area where education majors work on conservation projects to gain experience in developing environmental education programs at all grade levels.

Long a cooperator with the D'Arbonne Soil and Water Conservation District, Grambling University has a 200-acre farm for use by its agriculture students. About 50 acres of the farm are devoted to environmental education and special projects.

The environmental studies program began in 1972 when Dr. Charles Berry, director of the University's Division of Education, and Dr. R. L. Bailey, head of the agriculture program and director of the farm, met with SCS District Conservationist P. B. Colvin and Soil Conservationist Leon Blankenship to discuss the idea of using part of the farm for an environmental education program.

A faculty committee, with SCS assistance, developed a conservation plan for the outdoor classroom and selected sites for specific kinds of study.

To insure a multidisciplinary emphasis for the program, Dr. Berry invited division heads and key faculty members in education and science to review the proposed program.

The first teacher to use the outdoor classroom was Mrs. Pearl Vaughn, recreation coordinator at the college. A group of her students undertook a garden project.

"The farm is a fine place for students to learn about natural resources," Mrs. Vaughn commented. "One of the objectives is to show the students that the outdoors is beautiful. Some of our students still think of the farm as a place of misery; they are learning that it isn't."

Professor Sara Williams, who works with elementary education majors, has outlined environmental education courses so that the outdoor classroom can be used each semester.

Fourteen study sites are being developed on the 50-acre learning area. These include a pond for aquatic ecosystem studies, a soil profile site, wildlife habitat, woodland, and plant study stations.

"We hope eventually to have all of our 4,000 students taking part in outdoor classroom projects," Dr. Berry said. ♦

Future teachers at Grambling University are developing outdoor classroom projects and resource studies to enable them to carry on environmental education programs when they begin their teaching careers.

Dividends for the Future

by Dr. Constantine Curris
President, Murray State University, Murray, Kentucky

Conservation education is nothing new. It has been here for many years, but our failures have given it new meaning. A generation ago, most students learned virtually nothing about ecology or the need to conserve and manage wisely the natural resources. Occasionally we were exposed to a specialized area of the life sciences or the pure sciences, but no one taught us how all of the concepts fit together to make up a dynamic system, an ecosystem, that makes life continuously possible on this little island, Earth.

We just were never taught ecological interdependence, nature's systems engineering, so that we could understand that everything is tied to everything else, everything has a role to play, and that we ought not to tinker with any part of the system until we know what we're doing and what the consequences are likely to be.

In short, I am suggesting that education in its fullest meaning has a responsibility to prepare today's students to function in tomorrow's world—indeed, we must teach even those who choose not to be students.

How do we teach people about nature? How can we, working together with a common commitment towards environmental conservation, share our commitment and concern with others in a convincing manner which will lead to stewardship of and appreciation for the environment?

At Murray State University we have begun answering these questions not only though offering environmental education courses, but through a directed approach toward environmental study. The new College of Environmental Sciences is comprised of the departments of agriculture, biology, chemistry, physics, mathematics, geography, and geology. Other disciplines such as economics, sociology, and education are affiliates.

We have appointed a coordinator of environmental programs who works with other colleges of the University and functions as a liaison between the University and state and federal agencies.

Several new teacher education programs dealing specifically with environmental education have been inaugurated through our College of Human Development and Learning, which also provides several summer programs for teachers making use of the environmental education facilities at the TVA-sponsored Land Between the Lakes.

We have a very strong commitment at the University to see that those teachers who go forth into the schools of the nation are well trained in the techniques and process of environmental education so that their students may learn not from a standup lecture in the classroom but from actual participatory experiences in an outdoor classroom.

Too long our high school, our elementary school, and our university students have learned by reading and hearing instead of by doing. Educational research has shown that efficiency of learning varies directly with the number of the senses which are brought to use in interpreting one's observations.

Faculty members of the University and many of the teachers who come to the University for summer courses are aware that individually we do not have the expertise necessary to meet all the needs and answer all the questions. However, by working together with professional conservationists from agencies such as Forest Service, Soil Conservation Service, Fish and Wildlife Service, we can supply the necessary information and expertise to help them become teachers willing to use environmental education programs that include outdoor experiences.

It is not simply a question of

Edited from keynote address given by Dr. Curris at conservation education seminar in cooperation with the Soil Conservation Service at the University of Southwestern Louisiana, Lafayette, Louisiana, November 6, 1974.

technical expertise. The teacher must often be shown that there is nothing to fear outside the classroom, that the trust established between teacher and student in the classroom continues just as well in the outdoors. And, that the outdoor laboratory can be used not only for science, but for math, for increasing reading skill, and for stimulating creative efforts. The use of outdoor laboratories is unlimited and knows no discipline boundaries. Education truly becomes interdisciplinary in an outdoor classroom.

Most university presidents are increasingly aware that the university cannot be all things to all people. Not all universities can have forestry departments, or conservation departments, nor can we all have wildlife studies. But in any community there are individuals with these particular areas of expertise and understanding, so that when we bring them to share a common problem, solutions can be found.

For education is the best instrument for understanding change, for getting people to want to change for the better, for influencing action, and for igniting constructive action. As metropolitan areas increase in density, as more people move about more freely and more quickly over the countryside, the use of the land and its resources becomes increasingly competitive. It is imperative that we direct increased attention to the care and preservation of the resources. Here is where education meets a great challenge. Here is where strong, all-pervasive environmental education progams at national, state, and local levels can provide real dividends for the future. ♦

Willard Lovan, SCS district conservationist, discusses soils and land capabilities with Ronald Tines (left) and intern students Diana Bailey and Linda Markham as they plan an outdoor classroom.

Credits for an Outdoor Classroom

by Tom Marcum

Soil conservationist, SCS, Morgantown, Kentucky

Taking part in a new program, two seniors at Western Kentucky University in Bowling Green developed an outdoor classroom for an elementary school this spring as part of their internship training.

The outdoor classroom project is an innovation for the University's College of Education and was made a part of internship training requirements designed to give seniors practical field experience.

The two students, Linda Markham and Diana Bailey, worked with teachers at Fourth District Elementary School in the small community of Jetson in Butler County.

The idea for the outdoor classroom project originated with one of the teachers at the school, Ronald Tines. A graduate of Western Kentucky University, Tines worked with Dr. Fred Kirchner, chairman of the recreation department in the College of Education, to incorporate the outdoor classroom development into the University's internship program.

Tines supervised the program with SCS District Conservationist Willard Lovan, who provided technical help in developing the learning sites. The Butler County Conservation District, recognizing the importance of environmental studies in the schools, gave further support and help.

The five elementary schools and the high school in Butler County have agreed to serve as cooperators in providing the opportunity for University students to complete their professional training. The outdoor classroom project is scheduled to be offered each spring semester to graduating seniors.

The project had twofold benefits, Tines commented. It helped develop leadership qualities and self-confidence in the seniors and it stimulated interest and enthusiasm among the students by providing a variety of firsthand learning experiences. ♦

Project PREPARE and the Presumpscot River

by Samuel Zaitlin

Coordinator, Project PREPARE, University of Maine, Portland-Gorham, Maine

Several municipalities in Maine are now using information gathered by high school students during a watershed study this spring as a basis for helping local officials evaluate water quality problems.

The first study of its kind to be undertaken in Maine, Project PREPARE, which translates as "Presumpscot River Education Program for Awareness of the Regional Environment," is a joint venture of the University of Maine at Portland-Gorham and the Maine Association of Conservation Commissions.

Funding for the project came from the Office of Education, U.S. Department of Health, Education, and Welfare, under the Environmental Education Act.

Focus of the study was the Presumpscot River watershed. Students from six high schools collected water samples, analyzed them for various pollutants, and gathered data on the impact of pollution on the downstream areas as the river makes its way from Sebago Lake to the estuary on the coast.

The watershed approach was selected because it seemed the most suitable mechanism for water resource management studies and because it enabled students to gain a broad overview of the complexities of resource use and management in relation to the needs of municipalities affected.

Additionally, the watershed approach coincides with state and federal recognition of the need for broader based considerations in local land use decisionmaking.

The aim of Project PREPARE's activities was to establish within participating communities (1) the ability to assess and understand water quality problems and (2) a local group, in this case the schools, capable of serving the needs of the municipality in these problem areas.

Early in the planning of Project PREPARE, the Soil Conservation Service reviewed information on soils, timber resources, and hydrology and the usefulness of the study for wastewater planning.

Training for the water monitoring project began with a 3-day workshop in October 1974, under the direction of the Institute for Environmental Education, Cleveland, Ohio. The study unit was patterned in part on the Tilton Water Pollution Program published by the Environmental Protection Agency in 1972.

Students and teachers from the six participating high schools took part in classroom sessions and field trips to learn the techniques of water testing. They also learned how to put together inexpensive homemade water testing equipment and measure bacterial and chemical contamination.

Throughout the year, follow-up workshops were held to review testing methods and to explore some of the biological aspects of the Presumpscot River and the estuary.

From the outset, Project PREPARE worked closely with the Maine Department of En-

vironmental Protection (DEP). With DEP assistance, locations were established for testing stations and parameters were set for materials to be tested.

Eleven monitoring sites were chosen. Most of them corresponded to existing DEP stations for reasons of continuity with previous data collected, ease and safety of access, and site suitability. A few monitoring stations were also established on tributary streams at strategic locations.

Each of the six schools set its own monitoring schedule. Some monitored weekly and others biweekly. The usual practice was for students to collect samples in the field and return with them to the school for analysis. Samples were tested for the following parameters: air and water temperature, dissolved oxygen, pH, and total coliform levels. Not only did this in-field/classroom approach insure continuity, but it also allowed participants to share their experiences with classmates. Data from each group were forwarded to the coordinator who summarized the information for the participants and for DEP.

Sources of pollution, the students found, were primarily from municipal wastes and from pulp and paper mill operations. The students also learned that sewage treatment plants are costly, and that many of the pulp and paper mills have undertaken some control measures. The mills cooperated with the students in their project by supplying information and figures relating to efforts to reduce pollution in the river.

Teacher participation was encouraged by offering three graduate credits for the year-long commitment. The teachers took part in all of the training sessions and worked with students at the testing sites and in the laboratory. At the end of the project, they prepared a summary of activities and an evaluation.

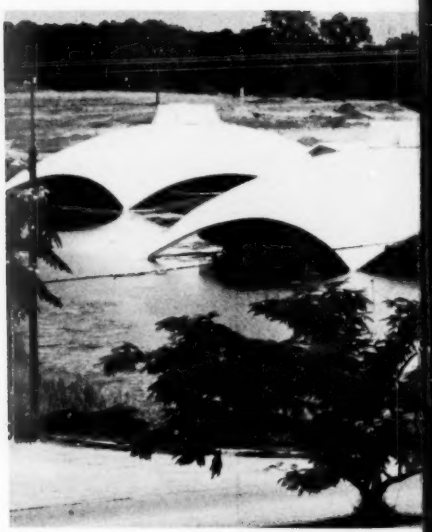
Most teachers emphasized the value of real-world experiences which students could relate to community needs and to the decisionmaking responsibilities of DEP as a state governmental agency.

As an indication of community support and interest, midway through the year several municipalities approached their respective schools with requests for assistance in evaluating local water quality problems. In one instance, the school team chose monitoring stations specifically to provide information to the town fathers as well as the DEP.

Project PREPARE completed its comprehensive study of the impact of pollution on the lower river and an analysis of the biological improvements taking place in the estuary in late February of this year. The project will be continued next year, with 12 schools scheduled to participate.

The success of the pilot program and the encouraging results contained in the study portend well for the future of the once grossly polluted river in southern Maine. ♦

How a Pond Turned Into a Classroom



by Mariam Young and Billy F. Smith
Science teacher, Montgomery Central High School, Cunningham, Tennessee, and district conservationist, SCS, Clarksville, Tennessee

Everyone knows about the city set on a hill, but not everyone has heard about the schoolhouse built on a lake.

Montgomery Central High School in Cunningham, Tennessee, sits atop a 3-acre lake that serves as an outdoor classroom. There, the school's 900 students study water ecosystems, collect plant and animal specimens for laboratory study, and enjoy it simply as a beautiful place to be.

The lake began as a pond designed by the Soil Conservation Service in 1950. It was built on the 100-acre site purchased by the Montgomery County School Board in 1939 and used for both elementary and high school buildings.

When a larger high school was needed by 1968, an architect incorporated the pond into the building design, enlarged it to its present size, and perched the circular administration building on the edge of the lake. Three "pods" containing open classrooms, study carrels, and media centers extend out over the water.

The lake is stocked by the Tennessee Wildlife Resource Agency with bass, bluegill, and channel catfish. Muskrat families live along the shore. Waterfowl often stop over a day or two during spring and fall migrations. Students are now placing nesting boxes for wood ducks to encourage permanent residents.

A mile-long learning trail winds along the lake through five different plant and animal communities, beginning with an oak-hickory woodland where violets, spring beauty, maypapple, and anemones brighten every spring, and where warblers, bluebirds, buntings, and dozens of other birds come to nest.

Out of the woods, the trail crosses a plant succession area that once was cleared for pasture. Farther along on a steep hillside, loblolly and white pine plantings by FFA members about 15 years ago show how one species can shade out other plants, and how tree plantings can slow erosion.

Nearby is a glade where reindeer moss and devil's matchstick grow between rocks and among the cedars. In this area, with its many dogwood trees, students come for discussions, study, poetry readings, picnics, and quiet observation.

In all, ten study sites are used by the students along the trail that ranges from gentle slopes to steep and sometimes eroding banks along a small intermittent stream. SCS conservationists help with soil and water projects, planting, and erosion control.

Elementary school youngsters are often accompanied on the trail by high school students who lead discussions, answer questions, and oversee investigations.

In such a setting, understanding environmental changes and ecosystem interrelationships is very much a part of the daily experiences of students. Teachers are free to take classes outdoors at any time, to assign special projects, and to make the most of that all-too-rare, often neglected "teachable moment." ♦

The 3-acre lake that surrounds Montgomery Central High School in Tennessee serves as an outdoor classroom for water ecosystem studies by elementary and high school students. The lake was developed from an SCS-designed pond when the architect incorporated the water area into the design for the building. It is part of a 100-acre school site that includes a mile-long learning trail and an elementary school in addition to the high school.

Conservation Education Interest Sparked by Iowa's County Committees

by Bernard Clausen and Charles McLaughlin

Associate professor of biology, University of Northern Iowa,
and assistant commissioner, Black Hawk Soil Conservation District, Cedar Falls, Iowa;
and chairman, Conservation Education Committee, Iowa Association of Soil Conservation Districts, Britt, Iowa

Environmental education programs come in all shapes and sizes. This flexibility has one great advantage—that of encouraging programs to meet a variety of needs rather than limiting conservation education efforts to monolithic uniformity.

Iowa is a prime example of a state where conservation education programs have been developed according to local interests and needs.

In 1967 Iowa educators and resource specialists began organizing County Conservation Education Committees. In many of the counties, soil conservation districts, as local governmental units with responsibilities for conservation programs, furnished leadership through their district boards.

Today about two-thirds of Iowa's 99 counties have some kind of conservation education programming. Some have developed official bylaws with County Conservation Education Committees; others operate informally under the leadership of a chairman.

Palo Alto County Board was the first to organize a Conservation Education Committee. A workbook for upper elementary grades was its first project.

County Conservation Education Committees include people from nearly every profession and age group—school administrators and teachers, high school students, businessmen, farmers, housewives, clergymen, and representatives from many civic and conservation organizations, as well as federal, state, and local resource agencies.

Frequently the administrators of public and parochial school districts are asked to name a representative teacher to serve on the committee. This helps recognize the education committee work as a professional responsibility rather than as a personal community service. A number of teachers serve as assistant commissioners of the soil conservation districts to provide liaison with these groups.

Programs within the counties are as varied as the organizational structures. Many districts devote considerable time and effort to teacher workshops in conservation education.

West Pottawattamie County Environmental Education Committee has for 2 years served as host for regional workshops

sponsored by the Iowa Conservation Education Council (ICEC), a statewide organization working to extend conservation education. West Pottawattamie also publishes a newsletter with conservation information and project ideas for teachers.

County Conservation Education Committee projects and activities include sponsoring speech, poster, essay, and other contests; publishing curriculum guides, coordinating field tours for schools and developing outdoor laboratories for schools, either on the school grounds or in cooperation with city or county park systems.

Jasper County Conservation Education Committee went a step further than most 3 years ago by making formal application for a $20,000 grant from the Office of Education, U.S. Department of Health, Education, and Welfare, under the Environmental Education Act. With the grant money for the 1973-74 school year, Michael Gross, a local high school biology teacher, was employed to carry out the consevation education program.

During the first year Gross helped 51 classes plan outdoor conservation education activities and developed curriculum resource guides for county schools. A survey in the fall of 1974 showed that two-thirds of the teachers in the county had participated in training through these programs.

The grant, extended for 1 year with reduced funding, expired this year, but the Jasper County Conservation Board, county schools, and the Jasper Soil Conservation District are continuing the program with local funds.

Financial support for County Conservation Education Committees comes from many sources within the counties, including business firms, civic and community organizations, women's clubs, and county conservation boards.

Many County Conservation Education Committees are now working to establish adult education programs in conservation. Soil conservation district leaders believe that people who are making decisions in land use and other environmental issues need to be better informed. ♦

Teacher training in conservation is a high priority for education committees in Iowa. The committees help sponsor 300 teachers to 2-day workshops each fall. Below, Beulah Anderson and Greg Martin, both members of the Palo Alto County Conservation Education Committee, update the conservation workbooks which the committee developed for 5th and 6th grade students. These workbooks are used around the state.

Wyoming Students Delve Into 'Energy and Us'

by Elizabeth Horsch, Roxie Dever, and Phoebe Holzinger
Chemistry instructor; social studies department chairman; and biology consultant, Kelly Walsh High School, Casper, Wyoming

Start with a temperature inversion. Mix in some emissions from a power plant. Add some interested and energetic students, a power company willing to cooperate, a lot of interest and expertise from industry, government agencies, the community, and a small Federal grant to fund the student-operated environmental study, and you have a year-long high school project called "Energy and Us."

Focus of the study was the coal-fired Pacific Power and Light Dave Johnston Power Plant located about 25 miles from Casper, Wyoming, near the small community of Glenrock. Fifty junior and senior students at Kelly Walsh High School in Casper planned, researched, and conducted an intensive multidisciplinary study of the conversion of stored energy to electrical energy.

Since coal for the plant comes from the company-owned surface mine 16 miles away, the students also investigated reclamation of mined land.

To learn what grasses are native to the area and might serve best for mined land rehabilitation, the students checked with Robert Tresler, state agronomist for the Soil Conservation Service. Tresler said that, with proper management, such species as thickspike wheatgrass, western wheatgrass, green needlegrass, and fourwing saltbush are among the native species that will work.

When the students wondered how long natural reclamation would take in the dry Wyoming climate, Tresler and George Davis, SCS district conservationist, arranged a bus tour to show examples of recovery of farmland plowed more than 50 years ago. The students found fencelines were still visible though no fences remained, and found several species of grass in the once-plowed area. The mixing of grasses that is beginning to occur is, in the course of natural succession, toward a climax plant community, Davis explained.

The class found, however, that mined land recovery is another story. Old spoil piles left bare of topsoil years ago showed no evidence of returning to productivity. This convinced the students that to achieve acceptable mined land reclamation, protection is needed. In addition, knowledgeable people are necessary to plan and carry out reclamation efforts.

The class conducted a variety of field studies at the Dave Johnston plant. Students planted pinto beans to test for sulfur dioxide emissions, and gladiolus bulbs on a study plot downwind from the plant to test for fluoride emissions. River water temperatures were monitored and the cooling water discharge made visible by dyeing the water red at the discharge point. Algal growth in the river was compared at points above and below the power plant. Snow samples were analyzed for fly ash content and pH. Dustfall samples were collected and studied. Students even made an attempt at growing plants in fly ash.

To determine the "people" impact of the plant, the class wrote and conducted public opinion surveys covering people's attitudes toward the plant. The students also studied changing economic patterns in the nearby community, receiving some information from the power company, but obtaining much of it by researching community records.

One interesting conclusion reached as a result of comparing tax revenue and school population was that the need for community services in a "boom town" precedes the money necessary to finance these services. Towns faced with sudden growth do not have the financial resources to provide the necessary services. Schools, sewer systems, water systems, recreation facilities, and law enforcement agencies are often inadequate to meet population influxes which accompany rapid growth.

With the beginning of the 20-day budget session of the state legislature, students began to realize that environmental

issues are political issues. To meet the national demand for electrical energy, many coal-fired energy conversion plants are planned for Wyoming, and would have significant impact on the environment. The class studied proposed legislation to regulate the siting of these plants to minimize their impact. The students were keenly disappointed when the bill died in committee on the day of their visit to the legislature.

One of the legislators who spoke to the class after the legislative session challenged the class to "quit sniping and offer some constructive input." As a result, two students, with the help of the class, prepared testimony on plant siting and delivered it before the Joint Interim Mines and Minerals Committee.

Two other students testified before a U.S. Senate Subcommittee on coal leasing on federal lands to express the concern of the class about the adequacy of Wyoming water reserves to accommodate the proposed utilization of Wyoming coal.

The students made available to the community the results of their study by slide presentations to interested groups, by filing the report of the completed study in the public library, and by serving as student resource people for other schools in the district.

Ultimately, it became apparent to the students that they were the consumers of the product which the power plant was producing and they had to accept some of the responsibility for the environmental impact of the power plant. The Pogo quote "We have met the enemy and he is us" gained new meaning.

Factors contributing to the success of the energy course were: (1) grant money from the Office of Education, HEW, to provide transportation for the class to various study and project sites, (2) a 2-hour time block which allowed onsite study, (3) community people who served as "walking textbooks," and (4) the realization by students and teachers alike that answers to environmental questions do not come easily.

For the teachers, the project afforded the opportunity to become involved in a very different learning situation. Since they were no longer the "experts," they were free to learn along with — and from — the students. Perhaps this "letting go" was the hardest lesson of all. ♦

Grasses that help in reclamation of surface-mined land were investigated by high school students in Wyoming during their year-long project, Energy and Us.

Reading the Environment

by Arlene Marturano and Dr. James Ward
Teacher, Gadsden Elementary School,
Gadsden South Carolina,
and professor of education,
University of South Carolina,
Columbia, South Carolina

Teachers frequently ask SCS conservationists for ideas that will help children in primary and early elementary grades relate outdoor classroom experiences to reading skills. Dr. James Ward, professor of education at the University of South Carolina at Columbia, and Arlene Marturano, classroom teacher at Gadsden Elementary School, have developed this series of outdoor learning exercises in observing, classifying, comparing, and generalizing to help beginning readers and students who have difficulty relating to the printed word. Larry Sandifer, SCS state information officer, has worked with Dr. Ward and Miss Marturano and suggested this article for Soil Conservation.

Pond studies help children interpret in words what they observe in the water, over the water, and under the water for a better understanding of space dimensions. Mapping the pond gives students experiences in shifting from reading printed words to "reading" the environment as they study the water ecosystem.

Reading the Water . . . Reading a Toad . . . Reading for Signs of Spring . . . Mapping a Living Room of Water . . . Mapping the Water Cycle. . . .

These are titles children have given some of their environmental education activities in the outdoor classroom at Gadsden Elementary School in South Carolina. They have come to realize that they are readers of their surroundings.

Traditionally, reading instruction in schools has focused on proficiency with printed material. However, recent literature in education suggests that reading is an active process of constructing meaning not merely from the printed page but from the child's entire environment.

Furthermore, reading the environment seems a natural prerequisite for success in reading the printed page. As the child's concepts and vocabulary grow, he or she can approach the printed page with a conceptual readiness and confidence that make reading for meaning possible and reading therefore more enjoyable, particularly for the student who has difficulty establishing reading skills.

Environmental education promotes concept development by engaging the child in activities which require reading the surroundings through a variety of conceptual skills. For example, observing, classifying, describing, comparing, and generalizing are the core of conceptual skills essential to all reading.

Since these skills operate primarily through language, facility with language is a coordinate goal of the activities.

One characteristic of language in teaching activities such as these developed at Gadsden school is its power to alert the senses. Reading the environment requires, in part, the gathering and collecting of sense data which add to environmental awareness as well as to conceptual skills.

Key words that can be suggested by the teacher or the students help to approach and to focus on the surroundings in a meaningful way.

In one exercise, the words "pulling," "framing," "shaping," and "coloring" were patterned in suggested activities such as "Pull words from the clouds," "Frame the flower with words," "Shape the vase with words," or "Color the oak tree with words" to encourage the children to apply their own words to whatever is being observed.

Other words that can be used as "frames" for viewing are "color," "size," "shape," and "happening." Using this device, the students learn to apply specific sensory observations to anything from a grasshopper's leg to tree bark, or to a soil profile, pond water, or almost any natural or man-made phenomena.

"Framing Filmstrips" is a close observation procedure which works well against a soil profile or a tree trunk. For this activity, a column of windows is cut into a sheet of flexible cardboard which is taped or fastened directly against the object to be studied. Parallel to the column of windows, a column of writing frames is positioned. For each viewing frame, the child writes a brief observation or story, and in so doing forms an observational "filmstrip."

This activity may be extended to a series of observations. For example, a soil study series might include filmstrips showing "Layers of Soil in a Gully," "Layers of Soil on Terraced Farm Land," or "Layers of Soil on the Bank of a Stream."

Each of these observations emphasizes the verbal mapping of the object through close observation and "languaging" the description of the object or area viewed. The verbal record, or map, becomes the child's mental map that functions as a probe for further readings.

The identification of sequences in stories is part of traditional reading programs. Environmental experiences emphasize the fact that sequences underlie all life experiences.

These sequences can be read by making use of words as sequence "frames." Such words as "First . . . Second . . . Third," "Before . . . After," "Now . . . Later," and "If . . . Then," when flashed upon a scene bring forth a variety of sequence stories that are part of forests, clouds, water, air—in fact, everywhere. Time, position, correlation, intersection, cause-effect, and, in general, all changes may be perceived and recorded through sequence frames.

Students observing pond water through the "Before . . . After" sequence frame noted "The water was rain before it was a pond," or "The pond formed after the rain."

Looking for the "Befores" and "Afters" helps children perceive relationships. Above all, we want the child's mental map to be a relationships map, not merely a collection of words.

Comparing is another reading skill which often poses problems for beginning readers. When children can relate comparisons to an activity, viewing things to be compared through the frames of "Alike" and "Different," they are able to compare any substances and occur-

rences—water and a raw egg, water and air, water and rock, or bare soil and grassy areas.

Preposition patterns can be an effective strategy in the outdoor classroom to help children capture relationships and happenings in another dimension. Observing a pond, students interpreted in words what is found in the water, on the water, over the water, under the water.

One particularly difficult language pattern for some children is that of verb tense. Activities that promote the use of tense contribute to the child's ability to perceive past, present, and future sequences and relationships.

By making use of such patterns as "It is a . . .," "It was a . . .," "It could become a . . .," the child lays hold of the concept of cycles. For example, the children found a female black widow spider with her egg sacs and observed her until the spiderlings hatched and the cycle was complete. Any tree can be observed through the same framing device to bring seed, seedling, sapling, and tree into focus. The caterpillar spinning a cocoon can thus be "tensed" in language to reveal the life cycle of butterflies and moths. The children come to understand that the environment of the schoolyard can furnish examples of many kinds of cycles and that language helps in the discovery of such cycles.

Interpretations must be made both in reading the printed page and in reading the environment. As the interpreter, the student must learn to shift fluently and view the information or object from different perspectives, each new perspective yielding new concepts.

The "It is a . . ." pattern can be repeated for the same object

"Alike" and "different" take on new dimensions when children list, in their own words, descriptions of objects and areas in their outdoor classroom. Here, a students finds new words and phrases to express her feelings about a tree in terms of color, texture, shape, and size.

to help the child become adept at shifting perspectives and thereby attaining new information.

A simple exercise was used to develop changing perspectives on a hanging fern basket at Gadsden school. The "It is a . . ." pattern as it was developed by the students showed the fern to be "a chlorophyll maker," "a water drinker," "a fern forest," "a gift," "a beautiful thing," "a plant in a swing," "a cloud maker," "a rain forest plant," "a little garden."

Students will begin experimenting with language patterns once they understand their ability to read their environment.

One such pattern which encourages verbal and laboratory investigations and experiments is that of "What happens when . . ." The teacher may set up observation sessions by asking, "What happens when you boil water?" "What happens when you grow a bean plant in light and another in no light?" "What happens when you let an open jar of water sit in the room?" This kind of patterning allows for investigation of the interaction between objects, such as water-heat, light-plants, water-air. Students enjoy extending the relationships inquiry to many kinds of phenomena.

Learning to read and interpret word symbols on the printed page is sometimes a major task facing the child when he enters school. Prior to that, the child must, of course, have learned to interpret the sounds of spoken language. Yet the use and understanding of both the spoken and written word are based on first learning to give meaning to surrounding objects and happenings.

By means of his senses the learner encounters the immediate environment and begins to develop the concepts that become his individual code—the environmental code — that enables him to carry on such mental operations as describing, classifying, and generalizing. By reading the environment in the outdoors, another dimension and subsequent extension is added to the perceptions that further skills in interpreting the printed page. ♦

A spider attracts the attention of two teachers in a workshop in environmental education organized and sponsored through the North Country (N.H.) RC&D Project.

'Mother Nature Cooperates to the Fullest' In RC&D Conservation Education in N.H.

by William R. Hauck
RC&D project coordinator, SCS, Littleton, New Hampshire

"Conservation education may be our most important RC&D measure," said James T. Brewer, retired Navy admiral and chairman of the executive board of the North Country (N.H.) Resource Conservation and Development (RC&D) Project.

"It makes sense to instill a conservation outlook in the human mind as well as on the physical environment."

Brewer was expressing his enthusiasm and that of the other 20 members of the executive board following a series of conservation education workshops which the RC&D representatives had helped organize for teachers.

Educators in the four counties of Coos, Grafton, Carroll, and Belknap, which make up the North Country RC&D Project area, had worked with federal, state, and county agencies in the initial conservation education effort to establish a spreading network of "outdoor classrooms" throughout this area rich in mountains, forests, and lakes. By intent, many of the study areas were installed on school grounds or handy to them.

Next step was to give teachers help and encouragement in using the outdoor laboratories

to full advantage to give young people a broad understanding of conservation management of resources and environmental issues.

For advice in preparing the teachers for outdoor classroom projects, staff members called on veteran educator Leslie Clark of the Society for the Protection of New Hampshire Forests.

Speaking from experience with the Kellogg Conservation Foundation and many years of programming learning activities at the Society's annual encampments, Clark said: "Above all, don't pigeonhole the program into math, science, and what-have-you. Help teachers see that resources run the whole gamut of subject-matter interests—from physics to phys-ed, from language arts to librarianship. And to immerse them, head over heels, in the out-of-doors you want them to understand.

"Make your program a link with the community," Clark added. "Teachers, after all, are in the business of trying to form complete, alert human beings who will some day make better the places where they live."

Taking their cue from Clark, the North Country conservationists launched a series of teacher-and-technician workshops. Their mission was to identify environmental lessons from centuries of man's intrusion within this natural wonderland—and how to open the pages of a "living textbook" visible to communities squarely dependent on their scenic heritage.

Leslie Clark himself served as one of the workshop staffers. Working with him were resource specialists from the Extension Service, Soil Conservation Service, and Forest Service.

Study areas included abandoned pastures, logged-off woodlots, alder thickets beside trout streams, and crumbling dikes of forgotten mill ponds. On actual sites of generations-old resource use and abuse, teachers and technicians exchanged professional information and ideas.

Equipment used during each field investigation represented the common tools of the trade of working conservationists: maps, tape measures, levels, soil augers, increment borers, and testing kits. Study materials and worksheets included those from the Forest Service "Investigating Your Environment" series.

Format for the workshops remained flexible according to the number of teachers enrolled and time available, but the basic objective was always the same—to demonstrate the tie-ins between the world outdoors and every subject studied in classrooms.

The workshops started with a brief What's-it-all-about session. The teachers were then grouped into four task forces without regard to specialty and assigned to a conservationist specializing in soil, water, plants, or wildlife, moving from one to another in rotation.

Reassembling after the field investigations, the group exchanged information, asked questions, and developed simulated situations for discussions on actual community problems and their relationship to resources just studied.

A brace of flying squirrels dove on SCS biologist Dave Allen's group just as he was talking about creatures of the dark . . .

At the new multimillion-dollar Middle High School in Gilford, on the shores of Lake Winnepesaukee, Principal Robert Morrison led his staff of 40 teachers in gathering ideas for environmental programs planned for the school's 200-acre outdoor learning site.

Throughout the 2-day session, as the group discovered how to measure streamflow, calculate degree of slope, study food chains, analyze soils, and trace the community's past through signs of land-use changes, Morrison encouraged the teachers to relate all aspects of the study to all subjects at all levels of the 5th through 12th grade student community.

After every workshop, participants commented that Mother Nature always cooperates to the fullest. The elements always put on some kind of sideshow. Rain often stampeded the streamflow measurements; a thundering ruffed grouse scared everyone out of a year's growth; there frequently was a hatch of mosquitoes or black flies! A brace of flying squirrels dove on SCS biologist Dave Allen's group just as he was talking about creatures of the dark—those teachers still believe that Dave somehow managed to spring the squirrels out of the tree by pulling a secret lever.

Recently more towns have

sought the unique environmental educational services offered in this area stretching from Lake Winnepesaukee to the Canadian border. In the Lakes region, in the Connecticut Valley, and in the heart of the White Mountains, similar workshops have brought teachers from Ashland, Jefferson, Gilmanton, Lincoln, Woodstock, Thornton, Wentworth, Wolfeboro, and Piermont.

With more than 200 teachers already given resource workshop training, there's a bright prospect that their thousands of students will also learn to heed the necessity for intelligent resource use planning. In that case, a citizenry aroused to the call for environmentally developed communities throughout northern New Hampshire is steadily maturing in local schools. ♦

SCS biologist Dave Allen leads teachers through a rain-soaked forest to study wildlife habitat. The trip was part of a teacher workshop sponsored by the North Country RC&D Project and assisted by resource specialists from several agencies.

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